Introduction

I appreciate the complexity of the task before this panel. You have had a fairly ambitious meeting schedule and a great deal of information to review so I appreciate this opportunity to provide comments and information.

As this panel well knows, there has been a great deal of discussion about the future of MTBE. The possibility of its elimination from, or reduced usage, in the market place (whether by regulation or market place barriers) has given rise to a variety of questions. One question is, of course, if MTBE is eliminated from gasoline, what alternatives exists to meet oxygen standards for reformulated gasoline programs? The most obvious alternative, in fact the only alternative currently available in large economically priced quantities, is ethanol. What I wish to do today is discuss the supply demand picture for ethanol and cover some of logistic issues involved were its use to be expanded.

Earlier this year my firm completed a study entitled "The Use of Ethanol in California Clean Burning Gasoline-Ethanol Supply/Demand and Logistics". The purpose of the study, which was done for the Renewable Fuels Association (RFA), was to assess the possibility of ethanol being used to replace MTBE in California, should need the need arise. I am providing a copy of this report to you today. Additional copies can be provided if you desire and the report is also available electronically on the RFA's web site at www.ethnaolRFA.org

The nature of the study was such that in order to determine availability of ethanol for the California market, we had to look at the national supply demand picture. Consequently I feel that this information should be of use to this panel.

First though looking at just a few of the key findings of our California study.

Observations from California Study

Slide #1

Table 1 - California Federally Mandated RFG Ethanol Requirements Projected 1999- Gallons

Area	Gasoline volume	5.7 v% ethanol
LA-Anaheim-Riverside	7,397,677,000	420,527,589
Sacramento	990,243,000	56,443,851
San Diego	1,267,283,000	72,235,131
Totals	**9,655,203,000**	**549,206,571**

- The oxygen demand for federal RFG areas in California equates to ~ 550,000,000 gallon of ethanol.

Slide #2

Table 2
Optional Scenario - 30% Ethanol Use In Non-federally Mandated Areas
Projected 1999 Gallons

State total	14,207,217,000	
Less RFG areas	9,655,203,000	
Non-federal areas	4,552,014,000	
	x 30% of market share	
Scenario #2	1,365,604,200	(30% market share)
	x 5.7% ethanol	
Additional ethanol demand	77,839,439	

California Ethanol Demand Scenarios - Gallons

Scenario #1	Federal RFG mandate areas only	550,000,000
Scenario #2	Add 30% non-mandate market	628,000,000

- For supply/demand assessment we also assumed that ethanol would be blended at 5.7v% in 30% of the remaining gasoline in the state thereby raising demand to ~ 650,000,000 gallons. This assumption was made since some ethanol may be required to maintain octane quality while meeting the California predictive model requirements in non-federal CARFG areas.

Slide #3

Table 3 -U.S. Ethanol Plants - Operational

Company	**Location**	**Capacity-MGY**
ADM	Decatur, IL	780
	Peoria, IL	
	Cedar Rapid, IA	
	Clinton, IA	
	Walhalla, ND	

Minnesota Corn Processors	Columbus, NE	85
	Marshall, MN	35
Williams Energy Services	Pekin, IL	100
Cargill	Blair, NE	100
	Eddyville, IA	
New Energy Corp.	South Bend, IN	85
Midwest Grain	Pekin, IL	78
	Atchison, KS	30
A.E. Staley	Loudon, TN	42
High Plains Corp.	York, NE	40
	Colwich, KS	20
	Portales, NM	15
Chief Ethanol	Hastings, NE	40
AGP	Hastings, NE	30
Nebraska Energy	Aurora, NE	30
Chippewa Valley Ethanol	Benson, MN	17
Corn Plus	Winnebago, MN	15
Al-Corn	Claremont, MN	15
Ethanol 2000	Bingham Lake, MN	15
Agri-Energy	Luverne, MN	15
Minnesota Energy	Buffalo Lake, MN	11
Alchem	Grafton, ND	10
Heartland Corn Products	Winthrop, MN	10
Grain Processing Corp.	Muscatine, IA	10
Reeve Agri-Energy	Garden City, KS	10
Pro-Corn	Preston, MN	10
Heartland Grain Fuel	Aberdeen, SD	8
Morris Ag Energy	Morris, MN	8
Georgia-Pacific	Bellingham, WA	7
Broin Enterprises	Scotland, SD	7
Mandildra Ethanol	Hamburg, IA	7
Parallel Products	Louisville, KY	7
	Cucamonga, CA	3
Wyoming Ethanol	Torrington, WY	4
J.R. Simplot	Caldweel, ID	3
	Burley, ID	3
Golden Cheese	Corona, CA	3
Merrick/Coors	Golden, CO	1.5
Kraft Inc.	Melrose, MN	1.5
Minnesota Clean Fuels	Dundas, MN	1.3
Jonton Alcohol	Edinburg, TX	1.2
ESE Alcohol	Leoti, KS	1.1
Pabst Brewing	Olympia, WA	0.7
Vienna Correctional	Vienna, IL	0.5
TOTAL		1715.8 million gal. per year (mgy)

Source: Bryan & Bryan Inc. and the Renewable Fuels Association

U.S. Ethanol Plants - Under Construction

Company	**Location**	**MGY**
Exol Corporation	Albert Lea, MN	30
Atkins Energy	Lena, IL	30
BC International	Jennings, LA	20
Nebraska Nutrients	Sutherland, NE	15

Central Minnesota	Little Falls, MN	15	
Heartland grain Fuels	Huron, SD	8	
Sunrise Ethanol	Blairstown, IA	5	
Total		123	million gal per year (mgy)

Source: Bryan & Bryan Inc. and the Renewable Fuels Association

• Total operational ethanol production capacity at year end 1998 stood at 1,715,800,000 gallons and plants under construction will add another 123,000,000 gallons of capacity for 1999. CBI imports will also contribute about 50 million gallons to the pool in 1999 and future years. This brings total availability of ethanol supply to 1.838 billion gallons exclusive of plants in the engineering/planning stages.

- In our study we estimated that 1998 ethanol production would reach 1.394 billion gallons which is consistent with numbers reported by both the EIA and RFA.

- The use of ethanol in RFG and the few remaining oxyfuel programs is estimated by RFA to be 650,000,000 gallons. Remaining gallons in 1998 were sold into the lower valued octane enhancement market, primarily in the Midwest.

Slide #4

Table 4 - Ethanol Supply Projections

1999 ethanol production capability	1,838,800,000
1998 production rate projected	1,394,400,000
Underutilized capacity	444,400,000
CBI ethanol	50,000,000
Total ethanol supply available	494,400,000

Scenario #1 demand..... 550,000,000
Scenario #2 demand..... 628,000,000

494,400,000 gallons of ethanol = 89.89% of scenario #1 demand and 78.73% of scenario #2 demand.

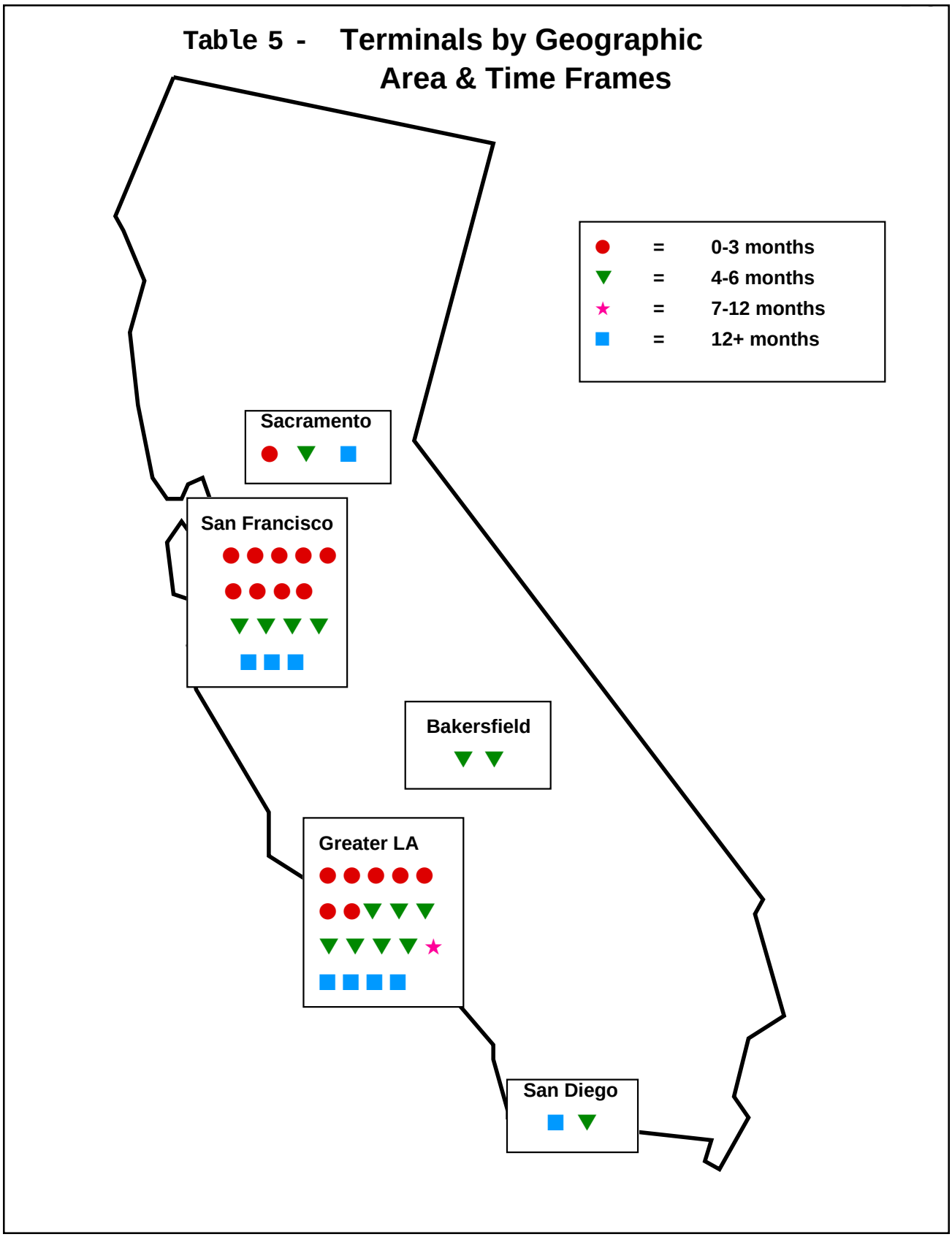
- The 628,000,000 demand for California would be met largely from currently under-utilized production which equates to 444,000,000 gallons with the remainder being redirected from the octane enhancement market.

- Transportation to the California market would be by a combination of marine cargo and rail movement for which adequate capacity exists. Once delivered to California, shipments would be broken down to smaller cargoes for delivery by transport to other outlying terminals. These scenarios are discussed more fully in the report.

- We believe that contrary to other assessments, ethanol delivered to the California market would be attractively priced. This would occur because the product would be directed from the lower valued octane markets where ethanol typically sells for the price of unleaded regular plus 54 cents per gallon. At the time we concluded the study ,ethanol could have been made available in California terminals in the $1.05 to $1.10 per gallon range. Of course this price moves up with gasoline prices which have recently risen.

Slide #5

Table 5 - Terminals by Geographic Area & Time Frames



- The real variable in California is storage availability. In the course of our study we conducted a survey of terminal owners/operators to identify tankage for available ethanol storage. Of the original 79 terminals assessed 10 did not distribute gasoline (i.e., lube oil, distillates, or pressurized product terminals). Of the 69 remaining, we received definitive answers for 51 locations. Of these, 32 (62.75%) indicated they could offer ethanol in six months or less. Furthermore, these terminals were geographically distributed in all major market areas.

- Some terminal operators indicated that their decision not to handle any ethanol was related more to lack of space for the appropriate CARBOB. Many terminals did not have space to carry both MTBE blends and an ethanol CARBOB. However this would not be the case if the majority of shippers were using ethanol.

- Contrary to some other assessments, we believe that it is not necessary to have ethanol in every terminal to achieve 100% market penetration. Terminals in close geographic proximity could utilize one common ethanol tank especially in the early stages of any program.

- Likewise we disagree that in-line injection equipment is necessary, or even desirable, in the early stages of a program. Splash blending provides flexibility for cross utilization of terminals in the early implementation phase and has been routinely and successfully used throughout the Midwest for years. However over the long term, in-line injection blending is the preferred option because it provides more control and better documentation for program compliance.

- There is really not much question that ethanol could be supplied to all or most all of the California ethanol market in a very short period of time. There is even less question that ethanol could be supplied to the entire California market over the phase out plan declared by Governor Davis which estimated a 100% removal of MTBE by December 31, 2002.

What I would like to do now is to apply some of the applicable findings of our study to the national level.

National Ethanol Demand/Supply

The USEPA recently estimated the ethanol demand if the entire oxygen requirement for all RFG areas were met with ethanol.

Slide #6.

Table 6 - Ethanol Demand for RFG Required Areas

Non-attainment Area	Gasoline (000s gallons)	Ethanol Demand (000s gallons)
Los Angeles	6,790,472	387,056
San Diego	1,184,678	67,526
Hartford	971,386	55,369
New York/No. New Jersey	6,676,592	380,565
Philadelphia	2,775,048	158,177
Chicago	3,325,110	189,531
Baltimore	979,957	55,857
Houston	2,331,633	132,903
Milwaukee	826,087	47,086
Total	25,860,963	1,474,074
Our total	25,860,963	1,474,070

Ethanol Demand for RFG Opt-in Areas

Non-attainment Area	Gasoline (000s gallons)	Ethanol Demand (000s gallons)
Maine (Portland)	528,187	30,106
New Hampshire (Manchester)	303,814	17,317
Massachusetts (Boston +)	2,720,116	155,046
Rhode Island (entire state)	568,066	32,379
New York (outside NYC)	184,362	10,508
Connecticut (remainder of state)	43,775	2,495
Delaware	69,222	3,945
New Jersey (Atlantic City)	402,702	22,954
Maryland/DC	2,074,690	118,257
Virginia	1,207,294	68,815
Texas (Dallas)	2,234,459	127,364
Kentucky (Louisville +)	553,986	31,577
Missouri (St. Louis +)	925,629	52,760
Total	11,631,939	663,020
Our total	11,816,302	673,523
Grand Total		2,137,094

As you can see from this table at the 5.7v% ethanol level required to meet a 2.0 wt.% oxygen level, RFG required areas would need 1,474,074,000 gallons of ethanol and current opt-in areas would require 663,020,000. This brings total demand for ethanol in RFG to 2,137,094,000 gallons.

From our California study we have already identified a current production capability of 1,838,800,000 plus 50,000,000 gallons of import for a total of 1, 888,800,000. Thus if all ethanol is directed to RFG use it could currently supply 88.38% of demand. Any remaining product would have to come from either new plants, or in the short term perhaps from imports.

Of course any changeover to ethanol would not be an overnight project but rather a transition over several months or perhaps longer. This would provide some time for supply to "grow" into the increased demand since such lead time would also be necessary to address various logistic issues primarily ethanol storage facilities and blending equipment. Many of the ethanol plants recently built have been brought on stream in under 2 to 3 years from start of construction.

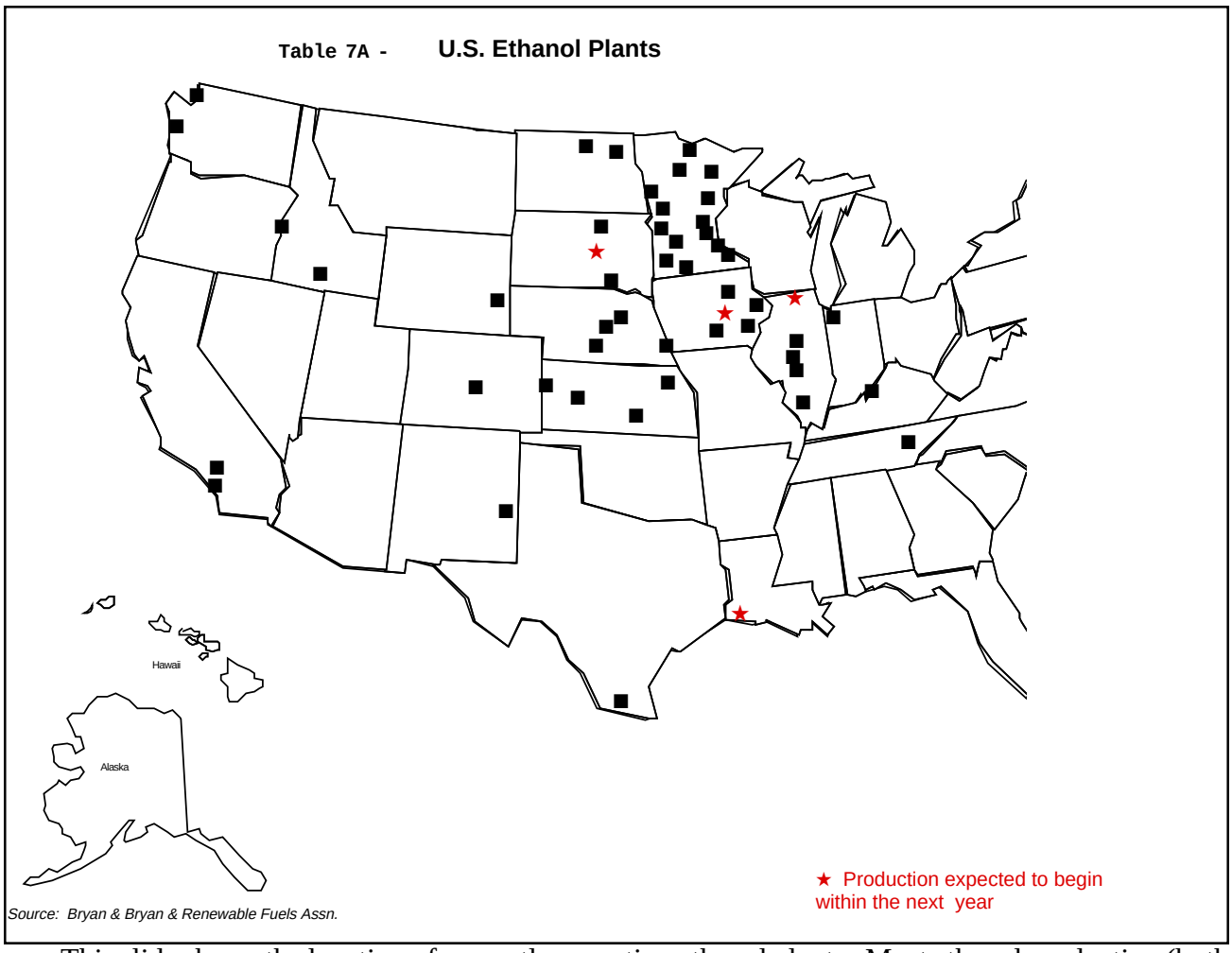
I would like to take just a few minutes to discuss what a conversion from MTBE to ethanol to meet RFG oxygen requirements would encompass.

Obviously such a conversion must be well thought out and provide a period of transition to address the nuances of such as change. But what exactly is involved? Let's assume for a moment that ethanol supply is adequate for the demand or perhaps a few areas are not converted initially to balance supply and demand. In this case, the issues become logistic.

Transportation

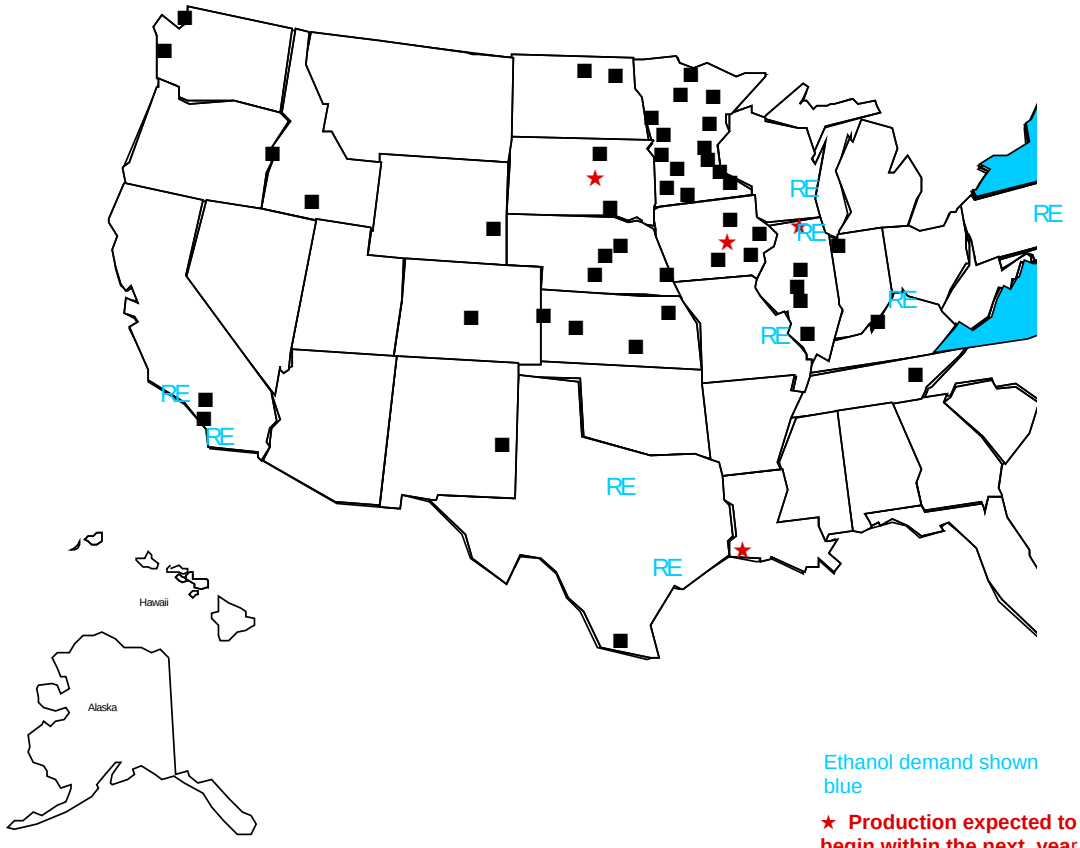
First the ethanol must be delivered to the RFG markets. Keep in mind that since ethanol is sensitive to water it is added at the terminal to avoid moisture contamination. There are no pipeline shipments for ethanol. The ethanol must be shipped to the end market.

Slide #7A & 7B



This slide shows the location of currently operating ethanol plants. Most ethanol production (both plants and volume) are located in the upper Midwest.

Table 7 B - **U.S. Ethanol Plants/ Ethanol Demand**



Source: Bryan & Bryan & Renewable Fuels Assn.

If we overlay this slide with a slide of the RFG markets, it is clear that there will be a significant amount of transportation involved. This transportation could be achieved with a combination of transport, rail, and marine cargo shipments.

In our California study we have already confirmed that the California markets would be supplied by a combination of ship and rail.

Slide #8

TABLE 8 - RFG Areas - Ethanol Delivery Methods

Truck/River Barge	**Barge & Rail**	**Rail Only**	**Ship/Ocean Going Barge/Rail**
Chicago	Hartford	Dallas	Los Angeles
Milwaukee			San Diego
Kentucky (Louisville +)			New York/New Jersey
Missouri (St. Louis +)			Baltimore
Houston - river barge			Maine (Portland)
			New Hampshire (Manchester)

Truck/River Barge	Barge & Rail	Rail Only	Ship/Ocean Going Barge/Rail
			Massachusetts (Boston +)
			Rhode Island
			New York (remainder)
			Connecticut (remainder)
			Delaware
			New Jersey (Atlantic City)
			Maryland/DC
			Virginia

In slide #8 I have broken down the most likely means of transportation to the RFG markets. Those in close proximity to Midwestern ethanol plants would be served by truck or in some cases by river barge. These markets would include Chicago, Milwaukee, Louisville, and St. Louis. Only one market is limited primarily to rail - Dallas. Hartford would likely receive shipments via river barge transshipment or by rail. The remaining markets, all along the eastern seaboard would likely receive product by ocean going barge with some additional product moving by rail.

Just to provide some rough idea of the transportation demands involved, I would offer the following observations. If we eliminate California (which is covered in detail in our study) this leaves 1,682,512,000 gallons of ethanol to move. Chicago and Milwaukee would move largely by truck with some barge shipments but that infrastructure in largely in place. So if we remove these markets, we are left with approximately 1.45 billion gallons of product to move. Given the predominance of water access to eastern seaboard markets, it is safe to assume that at least 60% of product would move by barge and no more than 40% by rail. This would equate to approximately 2071 river barge equivalent movements annually for an average of 172 per month. Of course a lot of this product would likely be staged in the gulf coast and put on ocean going barges which are of larger capacity. The rail shipments equate to about 20,000 rail car movements annually or an average of 1666 rail car movements monthly. Given the typical turn around time for rail cars from the Midwest to the east coast this would require 1500-1800 rail cars.

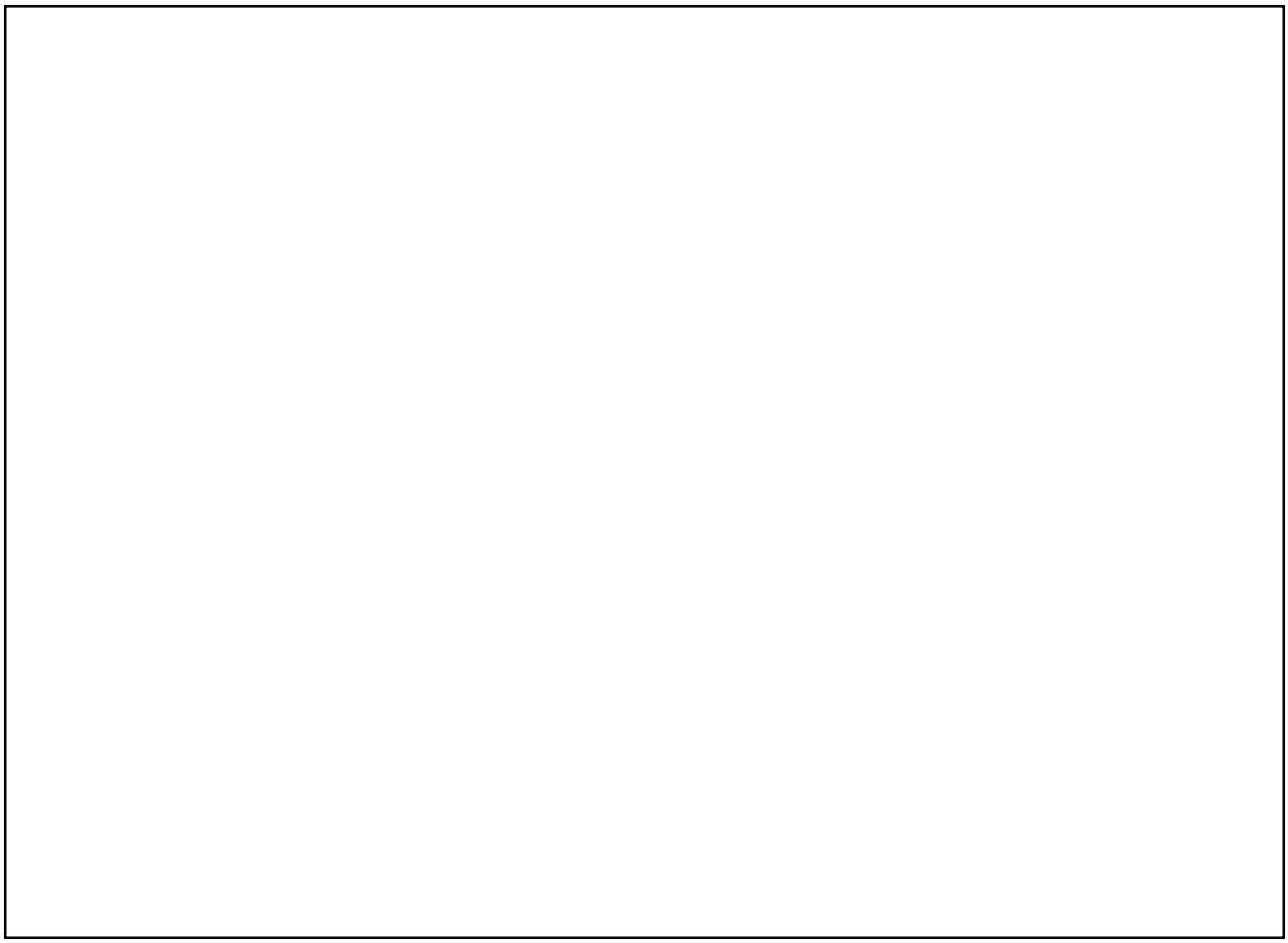
In most cases large volume shipments such as ship, ocean going barge, or unit trains would be delivered to large terminals. While some blending would likely occur at these terminals they would also serve as redistribution points (via transport) to smaller terminals that could either not store the large quantities involved or may not be accessible by rail. When considered in the scope of all petroleum product/petrochemical movements, these transportation demands are not particularly grand of scale.

The step in the process that would more likely need the most lead time is terminal analysis and preparation. Each terminal is unique because of variants in size, products handled, exchange partners, and modes of delivery. However the process of analysis is largely the same regardless of the circumstances. These considerations would include:

- Designating, reassigning, or in some cases constructing tankage to store ethanol.
  - must be sized to demand and 1.5 times largest anticipated delivery
  - must be piped to delivery mode
  - must be piped to gasoline rack
  - fixed roof with internal floating cover.
- Blending method
  - splash
  - in-line or injection blending
  - combination of both

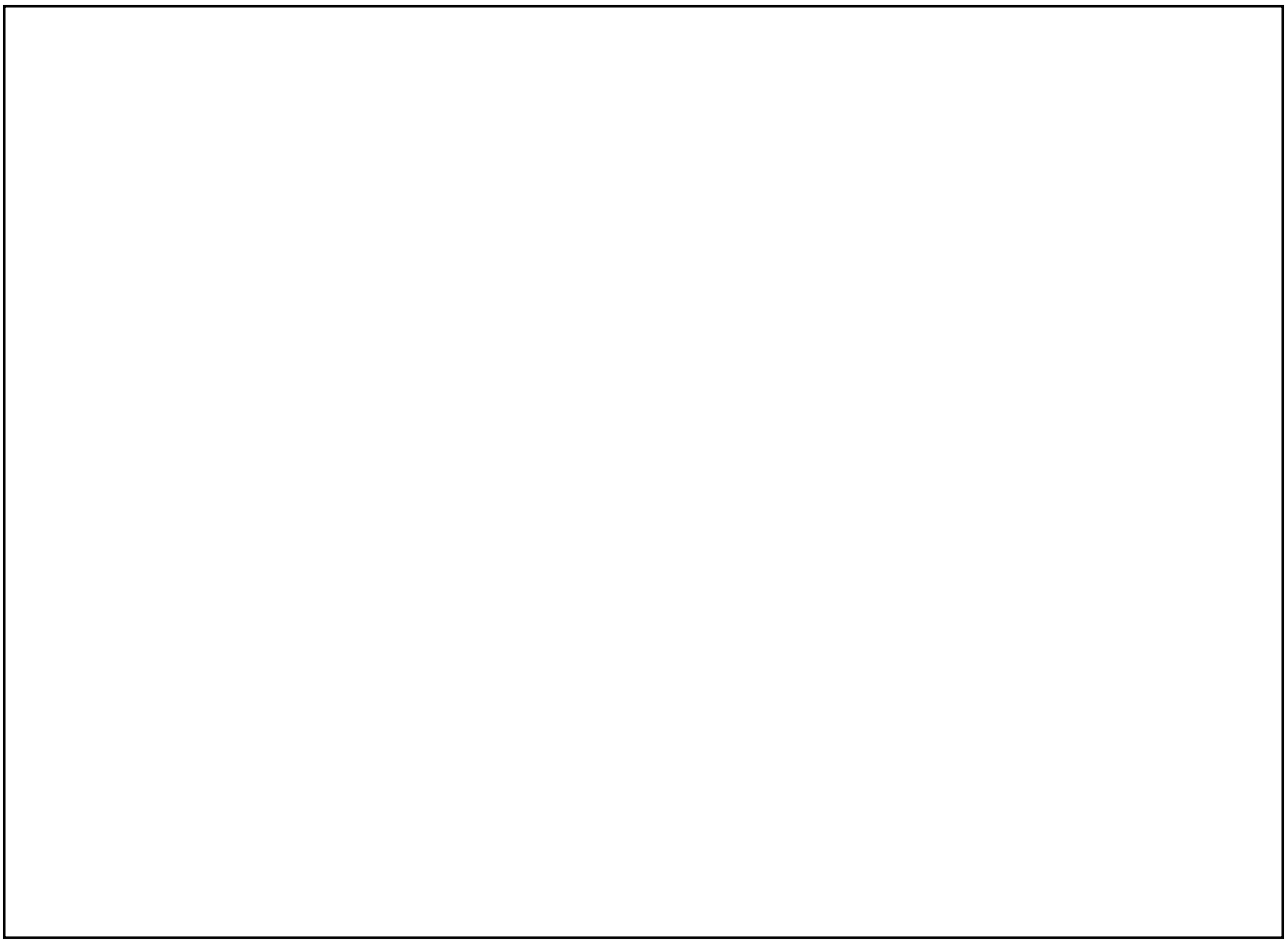
As far as tankage is concerned, tanks are routinely reassigned to various uses. This is not at all uncommon and in larger terminals this is what would occur. However in smaller terminals there may be only enough tankage for gasoline and diesel. In this case either a tank must be added for ethanol storage or the ethanol would need to be picked up at an adjacent or nearby terminal. I don't mean to minimize this issue. In the RFG areas there are hundreds of terminals involved.

Slide #9 Pipeline Map



I want to use just a couple of slides to demonstrate the complexities of the petroleum distribution system. This slide is from a petroleum products pipeline atlas which shows the pipeline network and 59 terminals in the greater New York area.

Slide # 10 New York Terminals



Looking at it another way, this slide from a petroleum terminals encyclopedia lists all of the terminals in New York state, a total of 81 terminals although not all are gasoline distribution terminals. I present this information because while on a terminal by terminal basis the task of incorporating ethanol is usually not tremendously difficult, in the context of the entire distribution system, some degree of lead time is obviously needed.

I believe the greater logistic impediment to current ethanol usage in RFG is pipeline shipment and storage of the necessary RBOB (CARBOB in the case of California). Currently with terminals handling MTBE based RFG (and in some cases conventional gasoline as well) there is simply not enough storage space to store additional grades of gasoline. Likewise it is difficult for the pipelines to facilitate small shipments of additional grades.

However should the current concerns about MTBE result in its removal from the market place (or drastic reduction of its use), the space that MTBE based RFG currently occupies could be used for an ethanol RBOB. This would apply to both terminal storage and pipeline shipments. You would simply be replacing one product with another.

Slide #11

In Summary

- Current ethanol supply is adequate to meet 88% of oxygen demand for RFG.
- Transportation logistics for moving ethanol from Midwest plants to coastal RFG markets are not overly problematic.
- Many terminals would reassign existing tankage to ethanol. Some terminals would have to add a tank or utilize another terminal for ethanol needs.
- In-line/Injection blending equipment is not necessary during the early stage of a program.
- Current primary impediment is lack of space for RBOB.
- RBOB could utilize space currently use for MTBE based RFG.
- Additional ethanol production could be added to meet demand (2-3 year lead time).
- Ethanol industry will rise to any challenge of increased demand.

In summary then, I think we can say the following:

- Ethanol supply is adequate to supply about 88% of the oxygen demand for RFG. This assumes product used for existing octane blending is redirected to RFG areas.
- New plants could be added to meet the additional demand. Lead time would likely require a 2 year-3 year time range.
- Transportation logistics to move ethanol from Midwestern plants to coastal RFG markets are not insurmountable but will require some planning. Ideally such needs would be phased in over a period of time so that adding the incremental number of rail cars and barges needed could be accomplished in an orderly fashion.

- Terminal storage for ethanol represents relatively small volume and in many cases existing tankage could be reassigned. There will be cases where it would be necessary to add a tank for ethanol age. However these companies could pick up ethanol at a nearby terminal at least temporarily. It is not necessary to have ethanol in every terminal to achieve full market place coverage.
- In-line injection blending equipment, though desirable in the long term, is not necessary during the early stages of an ethanol blending program.
- Shipment and storage of RBOB is currently problematic and likely to remain that way as long as MTBE based RFG takes up all the space in the storage and distribution system. However if MTBE based RFG ceases to enjoy large market share, an ethanol RBOB could simply occupy the space made available.
- Ethanol could be used as the oxygenate for a large majority of the RFG programs in a relatively short time frame. Supply is not the major constraint but rather logistic planning and preparation. However achieving total market coverage (with domestic ethanol) would require new ethanol plants be built. Construction of sufficient capacity to cover the remainder of the market would likely take from two to three years.

I think history has shown that each time a market place opportunity for ethanol has presented itself, the ethanol industry has risen to the challenge adding increased capacity. Playing a larger role in the RFG program would be no different.

I hope the information I have provided is of use to the panel. I would be happy to answer any questions you may have or provide any follow up information you may desire. Thank you.